

What is claimed is:

1. A battery charging apparatus comprising:  
a head covering; and  
a charging unit located on said head covering, said charging unit comprising:  
at least one photovoltaic cell mounted on said head covering;  
a nonphotovoltaic cell mounted on said head covering;  
a sending coil mounted to said head covering for inductively coupling to an  
implanted secondary coil; and  
a charge controller mounted on said head covering and connected to said at least one  
photovoltaic cell, said nonphotovoltaic cell, and said sending coil for coupling  
charging current from said at least one photovoltaic cell or from said  
nonphotovoltaic cell to said sending coil.
2. The apparatus of claim 1 wherein said nonphotovoltaic cell is a primary cell.
3. The apparatus of claim 1 wherein said nonphotovoltaic cell is a secondary cell.
4. The apparatus of claim 1 wherein said charge controller selects said at least one  
photovoltaic cell or said nonphotovoltaic cell as a charging source.
5. The apparatus of claim 4 wherein said charge controller is further for controlling the  
magnitude of a charging current to the sending coil.
6. The apparatus of claim 1 further comprising a battery charge indicator mounted on  
said head covering.
7. The apparatus of claim 1 wherein said head covering is cap.

8. A rechargeable power source comprising:
  - a battery-powered device implanted within the head of a person, a battery connected to said battery-powered device and implanted within the head of said person, and a receiving coil connected to said battery for providing charging current to said battery, said receiving coil implanted in said head of said person; and
  - a battery charging apparatus comprising:
    - a head covering; and
    - a charging unit located on said head covering, said charging unit comprising:
      - at least one photovoltaic cell mounted on said head covering; and
      - a sending coil mounted to said head covering for being aligned with said receiving coil, said sending coil electrically coupled to said at least one photovoltaic cell for inductively coupling power collected by said at least one photovoltaic cell to said receiving coil.
9. The power source of claim 8 wherein said charging unit further comprises a nonphotovoltaic cell electrically coupled to said sending coil and mounted on said head covering.
10. The apparatus of claim 9 wherein said nonphotovoltaic cell is a primary cell.
11. The apparatus of claim 9 wherein said nonphotovoltaic cell is a secondary cell.
12. The apparatus of claim 9 further comprising a charge controller on said head covering and connected to said at least one photovoltaic cell and to said nonphotovoltaic cell.
13. The apparatus of claim 12 wherein said charge controller selects either said at least one photovoltaic cell or said nonphotovoltaic cell as a charging source.
14. The apparatus of claim 13 wherein said charge controller controls a magnitude of a charge current to said receiving coil.
15. The apparatus of claim 14 further comprising a battery charge indicator mounted on said head covering.

16. The apparatus of claim 14 wherein said head covering is cap.

17. The apparatus of claim 9 further comprising a battery management system implanted in said person for controlling whether the device is powered by said implanted battery or by said sending coil.

18. The apparatus of claim 12 further comprising a battery management system implanted in said person for controlling whether the device is powered by said implanted battery or by said sending coil.

19. A method for recharging an implanted battery using a head covering having a charging unit located thereon, said charging unit comprising:

- a plurality of photovoltaic cells mounted on said head covering; and

- a sending coil mounted to said head covering for inductively coupling to an implanted receiving coil, said sending coil electrically coupled to said plurality of photovoltaic cells;

- the method comprising the steps of:

  - disposing the head covering to align the sending coil with a location of the implanted receiving coil;

  - exposing the head covering to light;

  - coupling power generated by the plurality of photovoltaic cells from the sending coil to the receiving coil; and

  - coupling current for recharging the implanted battery from the receiving coil to the implanted battery.

20. The method of claim 19, wherein the charging unit further includes a nonphotovoltaic cell disposed on the head covering, the method further including the steps of selecting the plurality of photovoltaic cells or the nonphotovoltaic cell as a source of charging power, and coupling power from the source of charging power to the sending coil.

21. The method of claim 20, wherein the charging unit further includes a source of external power and the step of selecting includes selecting the plurality of photovoltaic cells, the nonphotovoltaic cell, or the source of external power as a source of charging power.

22. A combination for providing power to an implanted device, comprising  
a head cover;  
a sending coil mounted to said head cover for alignment with an implanted receiving coil;  
a plurality of photovoltaic cells on said head cover;  
a nonphotovoltaic cell on said head cover;  
means for receiving power from a source off of said head cover; and  
a charge controller on said head cover and connected to said sending coil, said plurality of photovoltaic cells, said nonphotovoltaic cell, and said means to select one of said plurality of photovoltaic cells, said nonphotovoltaic cell, or said means to provide a charging current for the sending coil.

23. A combination for providing power through skin, comprising  
an implantable device with a receiving coil, a rechargeable battery, and a power management system connected to said receiving coil and said battery for selecting said receiving coil or said battery for providing to said implantable device and for coupling a charging current from said receiving coil to said battery; and  
a charging unit with a head cover, a sending coil mounted to said head cover for alignment with said receiving coil, a plurality of photovoltaic cells on said head cover, a nonphotovoltaic cell on said head cover, means for receiving power from a source off of said head cover, and a charge controller on said head cover and connected to said sending coil, said plurality of photovoltaic cells, said nonphotovoltaic cell, and said means to select one of said plurality of photovoltaic cells, said nonphotovoltaic cell, or said means to provide a charging current for said sending coil.